

IN THE CLAIMS:

Please amend claims 1, 3, 11, 13, 25, 26, 33 and 34 as follows:

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1. (Twice Amended) A method of forming an isolation structure for a semiconductor device, comprising:
providing a layered structure comprising a semiconductor substrate, a dielectric layer, and a buffer film layer;
etching said layered structure through said buffer film layer, through said dielectric layer, and into said semiconductor substrate to define a trench having sidewalls and a bottom;
forming an oxide layer on exposed portions of said semiconductor substrate within said trench;
selectively etching a portion of said buffer film layer in both horizontal and vertical directions;
applying a layer of isolation material directly to said buffer film layer and filling said trench;
removing a portion of said isolation material layer above said buffer film layer; and
removing said buffer film layer.

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3. (Amended) The method of claim 1, wherein selectively etching said portion of said buffer film layer [includes horizontal and vertical etching of said buffer film layer] includes performing said selective etching prior to said applying a layer of isolation material.

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11. (Twice Amended) A method of forming a capped shallow trench isolation structure for a semiconductor device, comprising:
providing a layered structure comprising a semiconductor substrate, a dielectric layer, and a buffer film layer;
etching said layered structure through said buffer film layer, through said dielectric layer, and into said semiconductor substrate to define a trench having sidewalls and a bottom;
forming an oxide layer on exposed portions of said semiconductor substrate within said trench sidewalls and said trench bottom;

selectively etching a portion of said buffer film layer in both horizontal and vertical directions to expose opposing trench edges at an intersection of said trench sidewalls and an upper surface of said semiconductor substrate;

applying a layer of isolation material directly to said buffer film layer and filling said trench;

removing a portion of said isolation material layer above said buffer film layer;

removing said buffer film layer; and

etching said isolation material to form said capped shallow trench isolation structure.

13. (Amended) The method of claim 11, wherein selectively etching said portion of said buffer film layer [includes horizontal and vertical etching of said buffer film layer] includes performing said selective etching prior to said applying a layer of isolation material.

25. (Three Times Amended) A method of forming an isolation structure on a semiconductor device layered structure including a semiconductor substrate, a dielectric layer, and a buffer film layer, said layered structure including a trench through said buffer film layer, said dielectric layer, and into said semiconductor substrate, wherein an oxide layer is formed on exposed portions of said semiconductor substrate within said trench, comprising:

selectively etching a portion of said buffer film layer in both horizontal and vertical directions;

applying a layer of isolation material directly to said buffer film layer and filling said trench;

removing a portion of said isolation material layer above said buffer film layer; and

removing said buffer film layer.

26. (Amended) The method of claim 25, wherein selectively etching said portion of said buffer film layer [includes horizontal and vertical etching of said buffer film layer] includes performing said selective etching prior to said applying a layer of isolation material.

33. (Twice Amended) A method of forming a capped shallow trench isolation structure for a semiconductor device layered structure including a semiconductor substrate, a

dielectric layer, and a buffer film layer, said layered structure including a trench through said buffer film layer, said dielectric layer, and into said semiconductor substrate, wherein an oxide layer is formed on exposed portions of said semiconductor substrate within said trench, comprising:

selectively etching a portion of said buffer film layer in both horizontal and vertical directions to expose opposing trench edges at an intersection of said trench and an upper surface of said semiconductor substrate;

applying a layer of isolation material directly to said buffer film layer and filling said trench;

removing a portion of said isolation material layer above said buffer film layer;

removing said buffer film layer; and

etching said isolation material to form said capped shallow trench isolation structure.

34. (Amended) The method of claim 33, wherein selectively etching said portion of said buffer film layer [includes horizontal and vertical etching of said buffer film layer] includes performing said selective etching prior to said applying a layer of isolation material.

REMARKS

This amendment is in response to the Final Rejection mailed on October 11, 2000.

Claims 1 through 5, 11 through 17, 25 through 28 and 33 through 38 are currently pending in the application.

Claims 1 through 5, 11 through 17, 25 through 28 and 33 through 38 stand rejected.

After carefully considering the cited references, the rejections, and the Examiner's comments, Applicant has amended the claimed invention to clearly distinguish over the cited references.

35 U.S.C. § 102(e) Anticipation Rejections

Claims 1 through 4, 11 through 14, 16, 25 through 27, 33 through 35 and 37 were rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent 5,712,185 issued to Tsai et al (hereinafter "Tsai"). Applicant respectfully traverses this rejection, as hereinafter set forth. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Independent claims 1, 11, 25, and 33 are not anticipated by Tsai because Tsai does not teach the act of selectively etching a portion of the buffer layer in horizontal and vertical directions. Such a limitation was previously included in dependent claims 3, 13, 26 and 34, however, the Examiner has not addressed this limitation in the rejection based upon Tsai.

Tsai teaches that the silicon nitride layer 34 is covered by a sacrificial layer 36, and that the silicon nitride layer be "undercut and descumed." (Col. 3, lines 19 - 20; Fig. 3E - 3G). Furthermore, Tsai teaches that "[a]fter the descum process, the sacrificial layer 36A can be optionally removed" (Col. 3, lines 34 - 35) showing that the sacrificial layer prevents etching in more than the horizontal direction. With the presence of a sacrificial layer, the "undercutting and descuming" of the silicon nitride layer occurs only in the horizontal direction, not both vertically and horizontally, as by the proposed amendments to independent claims 1, 11, 25 and 33. Thus, Tsai fails to disclose every limitation as set forth in claims 1, 11, 25 and 33, as proposed to be amended. Applicant, therefore, submits that independent claims 1, 11, 25 and 33 are clearly not anticipated by Tsai, and respectfully request allowance thereof.

Applicant further submits that claims 2 through 4 are allowable as depending from claim 1, which is allowable; claims 12 through 14 and 16 are allowable as depending from claim 11, which is allowable; claims 26 and 27 are allowable as depending from claim 25, which is allowable; and claims 34, 35 and 37 are allowable as depending from claim 33, which is allowable.

With respect to claims 3, 13, 26 and 34, as proposed to be amended, Tsai also fails to disclose the acts in the recited order according to the proposed amendments of such claims. Specifically, each of claims 3, 13, 26 and 34, as proposed to be amended, recites selectively etching a portion of the buffer film layer before applying a layer of isolation material thereto and within the trench.

35 U.S.C. § 103(a) Obviousness Rejections

Claims 5, 15, 28 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsai et al. as applied to claims 1 through 4, 11 through 14, 16, 25 through 27, 33 through 35 and 37 above, and further in view of United States Patent 5,834,358 issued to Pan et al. (hereinafter Pan).

Claims 17 and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsai et al. as applied to claims 1 through 4, 11 through 14, 16, 25 through 27, 33 through 35 and 37 above.

Applicant respectfully submits that dependent claims 5, 15, 28 and 36 are not rendered obvious by Tsai in view of Pan because a dependent claim is only obvious if the independent claim from which it depends is obvious. *See In re Fine*, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988), *see also* M.P.E.P. § 2143.03. Since claims 5, 15, 28 and 36 depend directly from allowable independent claims 1, 11, 25 and 33, respectively, they are not rendered obvious.

In addition, Applicant submits that claims 17 and 38 are not rendered obvious because they are dependent from independent claims 11 and 33 respectively, which are allowable.

ENTRY OF AMENDMENTS

Applicant requests the entry of this amendment for the following reasons:

The proposed amendment clearly places the application in condition for allowance.

The proposed amendments to claims 1, 3, 11, 13, 25, 26, 33 and 34 are supported by the as-filed specification and drawings and comply with the provisions of 35 U.S.C. § 132 as no new matter is added to the application.

The proposed amendments to the claimed invention do not raise new issues or require a further search. With respect to the proposed amendments to claims 1, 11, 25 and 33, the additional subject matter previously appeared in dependent claims 3, 13, 26 and 34, respectively. As each of claims 3, 13, 26 and 34 has been examined, this subject matter has already been examined and will not require a new search or raise additional issues.

If the Examiner determines that the amendment does not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Upon entry of the proposed amendments, claims 1 through 5, 11 through 17, 25 through 28 and 33 through 38 are believed to be in condition of allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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